

# Digital Well Planning

## Using DrillPlan to optimize well planning on an old giant



equinor

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Project Manager - Schlumberger

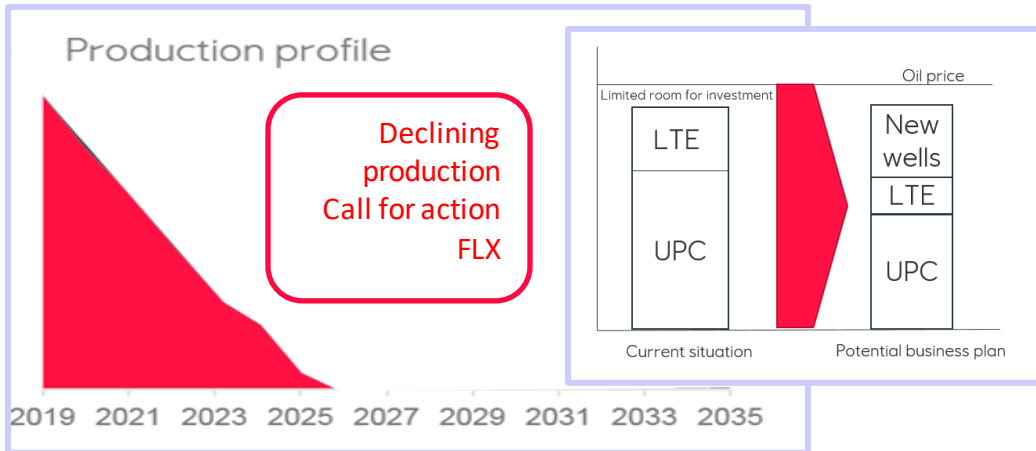
Atle Sivertsen  
VP FLX Wells - Equinor



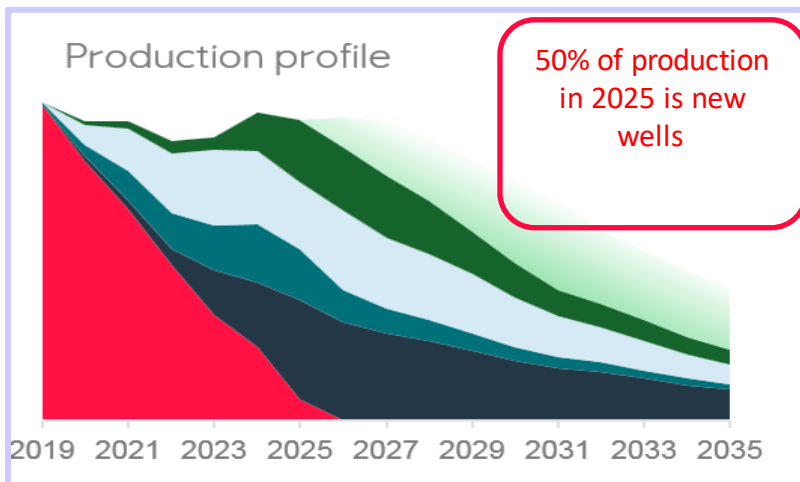
Schlumberger

# FLX Ambitions - Transforming the NCS to deliver sustainable value for decades

## Create room for investment ...



## ... to extend lifetime



Ambition

## Create room for new investment

**~25%**

Cost reduction

+

Increased reserves

**~200%**

Reserve increase

+

Safe & Sustainable operations

**~50%**

CO2 reduction



## Become a lighthouse for the future on the NCS

- our safety culture
- our performance culture
- our operating model (New ways of working)
- our supplier collaboration



# FLX Wells: Objectives and drivers



**Operational objective**

**Increase number of high value wells and well interventions**

**Drivers**



**Always safe**



**Enablers**



**Zero Harm**



**One Team**



**Maximize production and reduce well cost**



**Future ways of working**



**Efficient rig utilizations**



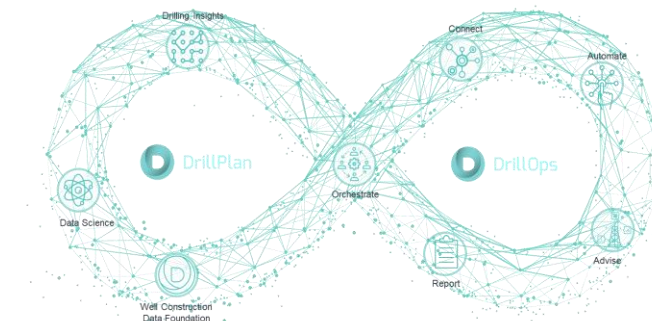
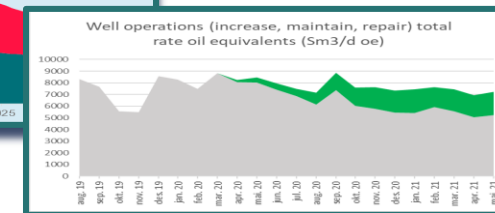
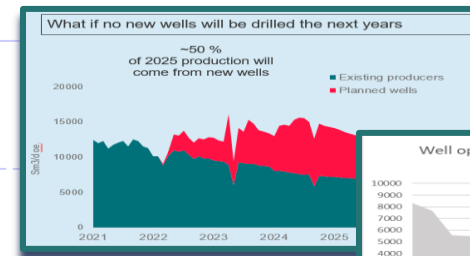
**Balanced barebone portfolio**



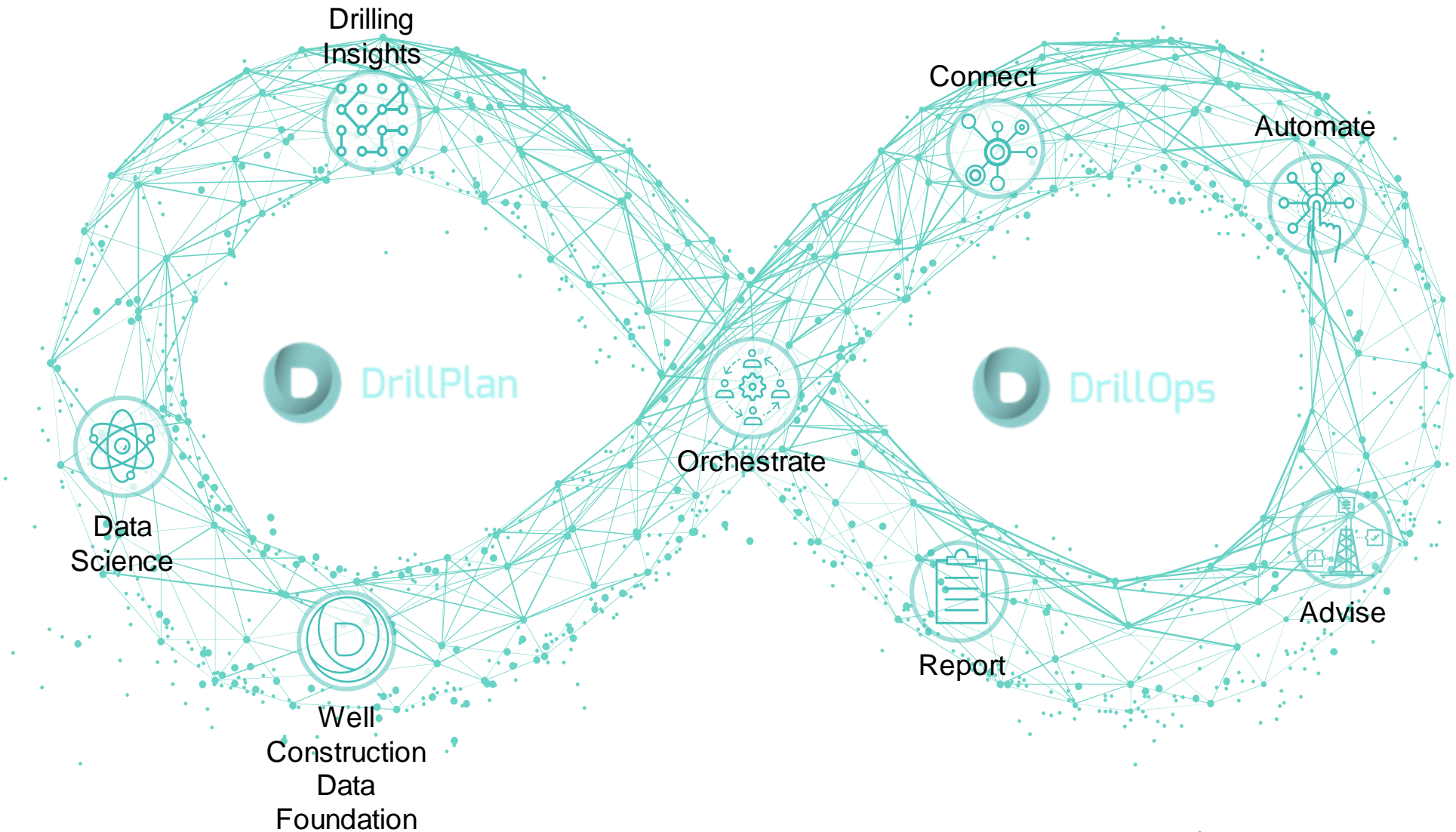
**Digitalization**



**Late life work process**



# The Integrated Digital Drilling Solution



## Use of DrillPlan in FLX



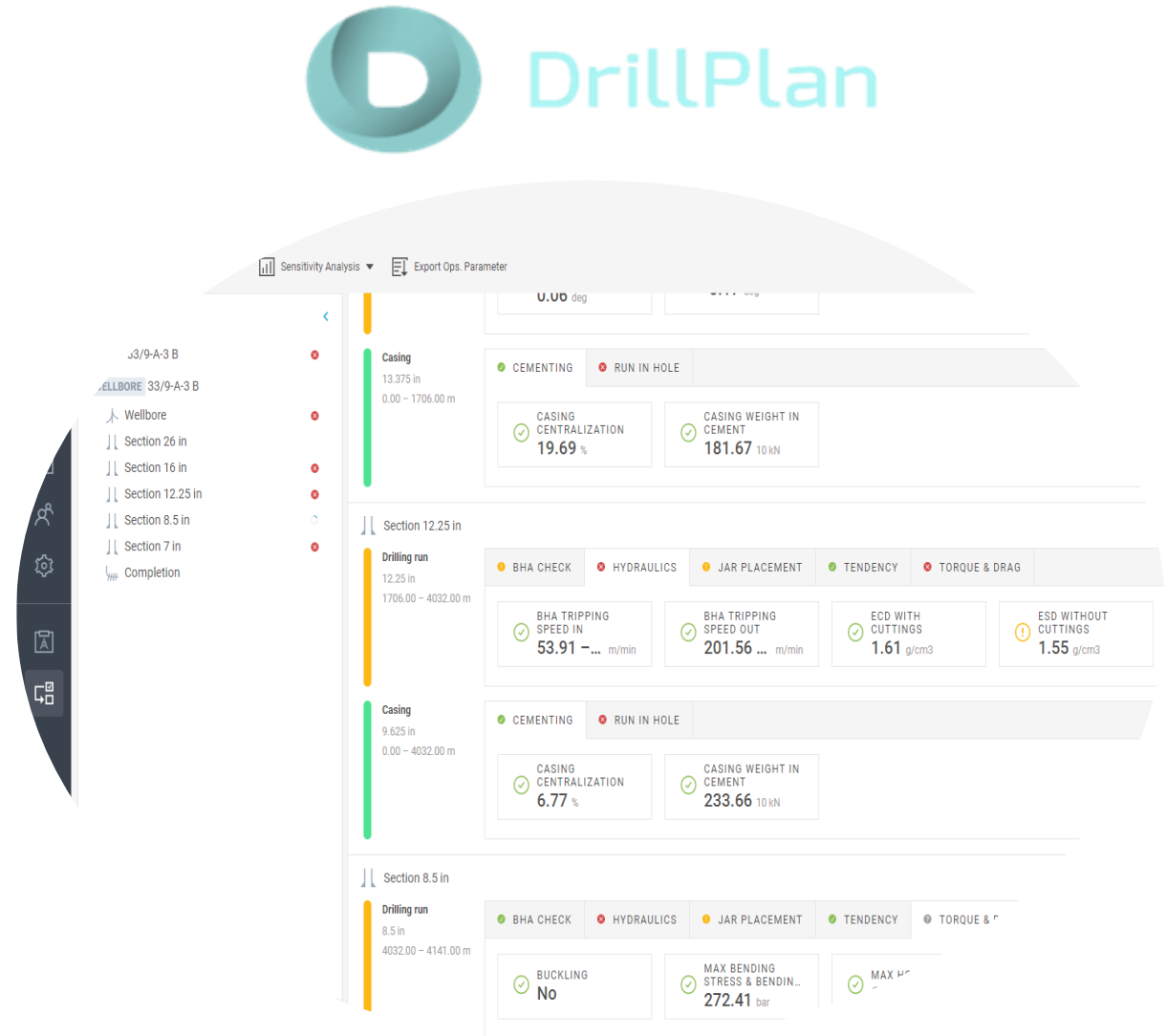
# Use of DrillPlan in FLX

- Template designed for all standard well designs on Statfjord

The screenshot displays the DrillPlan software interface. At the top, the DrillPlan logo is visible. Below it, a navigation bar includes options like 'View Plan History', 'Manage Wellbores', 'Fetch Data', 'Download Data', and 'Show Design Template'. The main interface is divided into two sections: 'FIELD' and 'WELL'. The 'WELL' section is further divided into '33/9-A-3 B' and '33/9-A-3 B'. The '33/9-A-3 B' section shows a list of well sections: Section 26 in, Section 16 in, Section 12.25 in, Section 8.5 in, Section 7 in, and Completion. The '33/9-A-3 B' section displays a grid of task cards, each with a status indicator (COMPLETED) and a date. The tasks include: Surface Location (Oct 04 2021), Rig Configuration (Nov 09 2021), Activity Plan (Nov 08 2021), Risks (Nov 05 2021), Well Barriers (Oct 06 2021), \_1P\_Cement (Oct 19 2021), TFM\_PnA\_Program (Oct 11 2021), TFM\_Completions\_Program (Oct 11 2021), Reservoir Pressures (Oct 20 2021), \_Cement\_Program (Oct 26 2021), Well PPFG/WBS plot (Nov 07 2021), Contacts and Gradients P&A (Nov 07 2021), Fluid contacts and gradients (Nov 07 2021), A-3 B Preliminary Target R04 [20in kick off] (Oct 20 2021), Wellbore Geometry (Nov 03 2021), Formation Temperature (Oct 04 2021), Pressure Window (Oct 04 2021), Formation Top (Oct 04 2021), AUBE05\_Geological (Oct 04 2021), and AUBE05\_Driller (Oct 04 2021).

# Use of DrillPlan in FLX

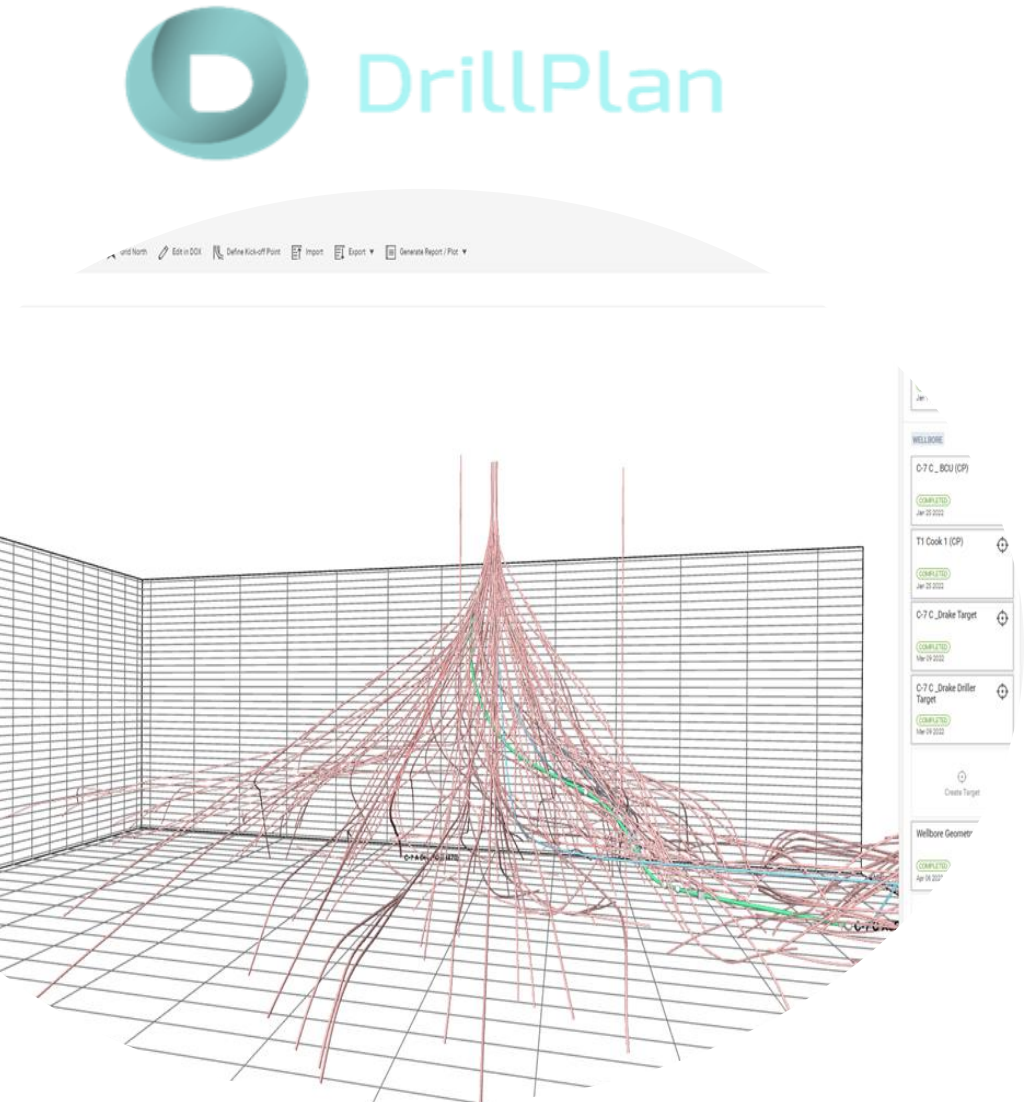
- Template designed for all standard well designs on Statfjord
- Quick Design validation in Well selection phase





# Use of DrillPlan in FLX

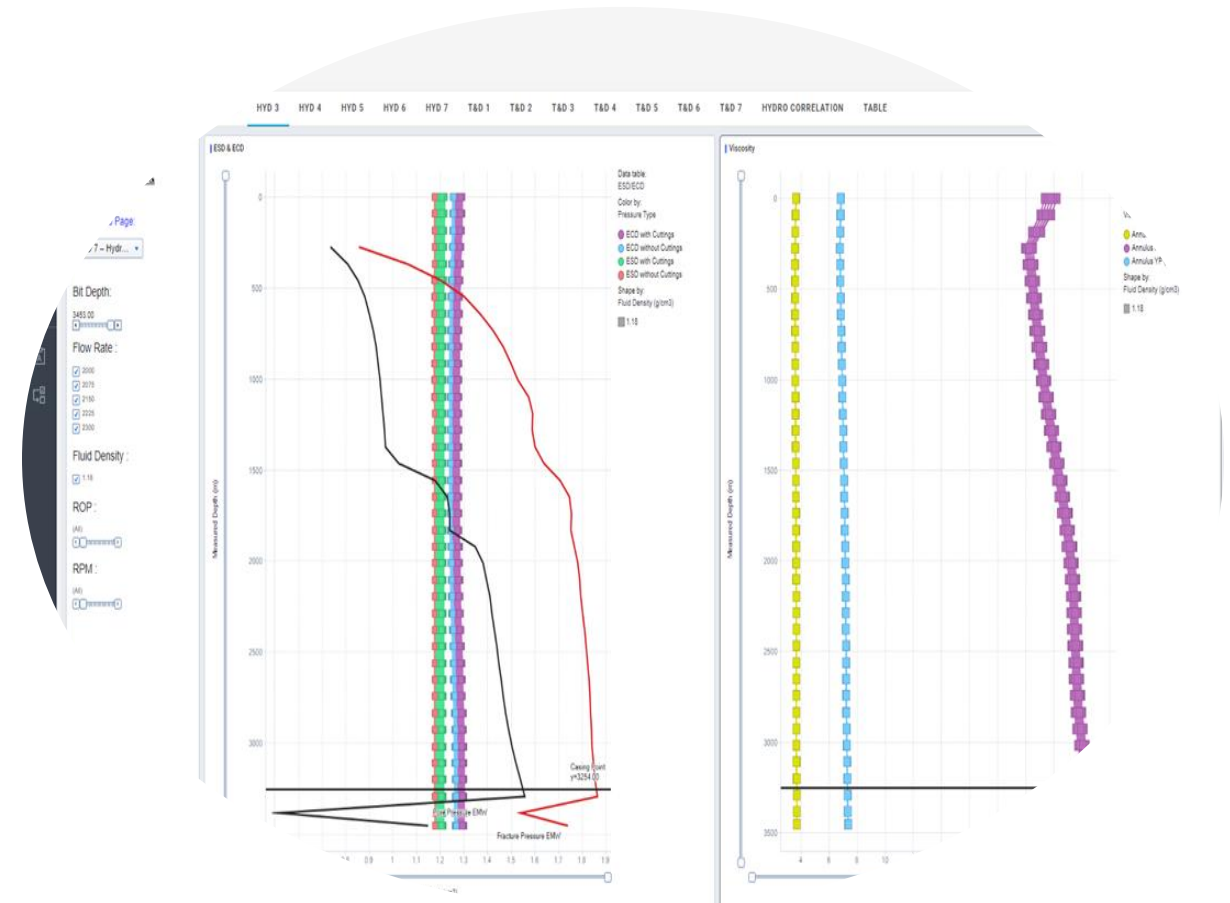
- Template designed for all standard well designs on Statfjord
- Quick Design validation in Well selection phase
- SLB IWC Team Internal Use of DrillPlan for Trajectory design, BHA design, Fluid Design and Completion Design





# Use of DrillPlan in FLX

- Template designed for all standard well designs on Statfjord
- Quick Design validation in Well selection phase
- SLB IWC Team Internal Use of DrillPlan for Trajectory design, BHA design, Fluid Design and Completion Design
- FLX Team use of DrillPlan for sensitivity analysis and design validation



# Use of DrillPlan in FLX

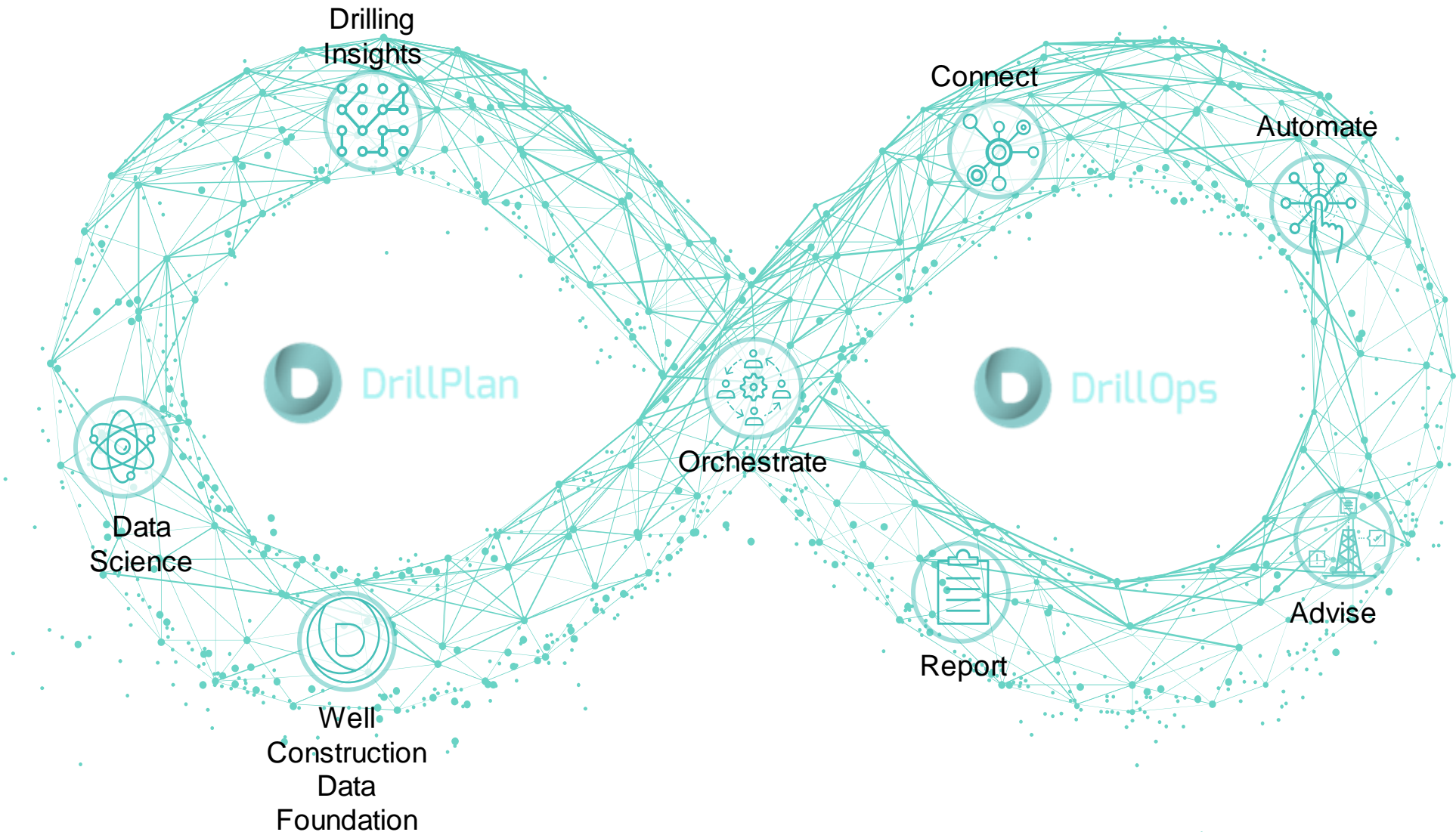


- Template designed for all standard well designs on Statfjord
- Quick Design validation in Well selection phase
- SLB IWC Team Internal Use of DrillPlan for Trajectory design, BHA design, Fluid Design and Completion Design
- FLX Team use of DrillPlan for sensitivity analysis and design validation
- FLX Team use of DrillPlan to create Activity Program

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# The Integrated Digital Drilling Solution



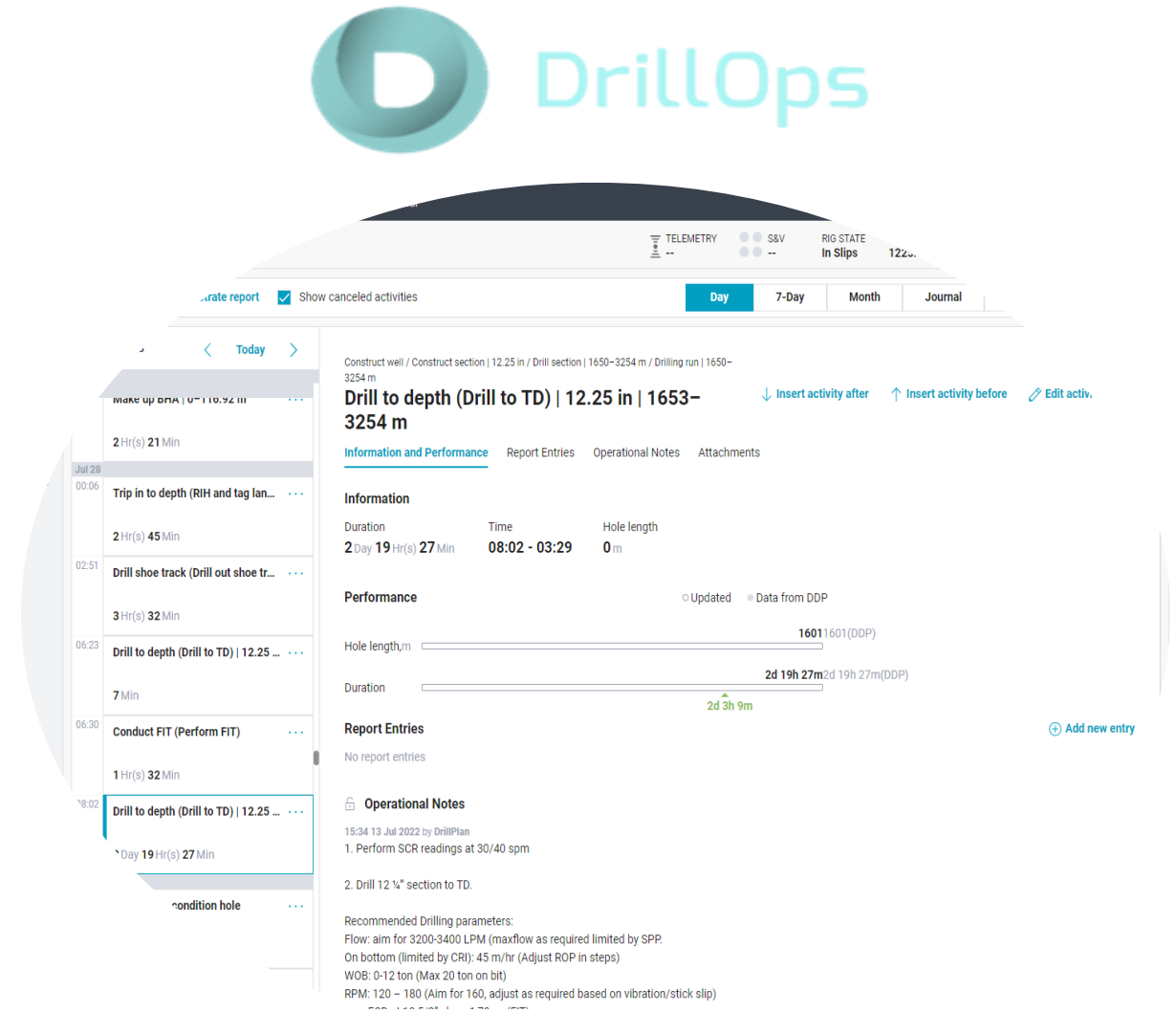
# The Integrated Digital Drilling Solution



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# Use of DrillOps in FLX

- Implementation of DrillOps Orchestrate to reduce planning time and produce high quality and structured DOP's



# Use of DrillOps in FLX

- Implementation of DrillOps Orchestrate to reduce planning time and produce high quality and structured DOP's
- Implement DrillOps Report to automatically capture activity notes and reduce time spent offshore on reporting



Operations Summary

Summary for Period 0000 Hrs to 2400 Hrs on 21 Nov 2019

Operations for Period 0000 Hrs to 2400 Hrs on 21 Nov 2019

PH	OPN	WS OPN	From	To	Depth (m)	NPT Level	Description
D12	DRS	ROT	00:00	01:36	1,026.6	0	Drill ahead rotary (Surface) from 966.41 m to 1,026.63 m with Avg Surface 40 rpm, 2 m/min Avg Flow, 12,384 kPa Avg SPP On Bottom, 5.74 KdaN Avg WOB
D12	DRM	SLI	01:36	02:05	1,038.0	0	Drill ahead sliding from 1,025.29 m to 1,038.00 m with Avg Surface 8 rpm, 3 m/min Avg Flow, 13,743 kPa Avg SPP On Bottom, Avg WOB
D12	DRS	ROT	02:05	03:51	1,084.4	0	Drill ahead rotary (Surface) from 1,025.15 m to 1,084.43 m with Avg Surface 37 rpm, 2 m/min Avg Flow, 11,840 kPa Avg SPP On Bottom, 6.34 KdaN Avg WOB
D12	DRM	SLI	03:51	04:23	1,090.5	0	Drill ahead sliding from 1,081.79 m to 1,090.51 m with Avg Surface 13 rpm, 3 m/min Avg Flow, 14,099 kPa Avg SPP On Bottom, 1.12 KdaN Avg WOB
D12	DRS	ROT	04:23	05:31	1,125.8	0	Drill ahead rotary (Surface) from 1,080.65 m to 1,125.80 m with Avg Surface 42 rpm, 2 m/min Avg Flow, 12,988 kPa Avg SPP On Bottom, 7.11 KdaN Avg WOB
D12	DRM	SLI	05:31	05:59	1,131.7	0	Drill ahead sliding from 1,125.57 m to 1,131.66 m with Avg Surface 9 rpm, 3 m/min Avg Flow, 15,072 kPa Avg SPP On Bottom, 0.95 KdaN Avg WOB
D12	DRS	ROT	05:59	07:01	1,165.2	0	Drill ahead rotary (Surface) from 1,120 Surface 36 rpm, 2 m/min Avg Flow, 1 8.72 KdaN Avg WOB
D12	DRM	SLI	07:01	07:15	1,167.8	0	Drill ahead sliding from 1,162.07 m to rpm, 3 m/min Avg Flow, 15,963 kPa / Avg WOB
D12	DRS	ROT	07:15	15:31	1,450.1	0	Drill ahead rotary (Surface) from 1,157 Surface 44 rpm, 2 m/min Avg Flow, 1 6.76 KdaN Avg WOB
D12	DRM	SLI	15:31	17:34	1,466.0	0	Drill ahead sliding from 1,450.04 m to rpm, 3 m/min Avg Flow, 16,200 kPa / Avg WOB
D12	DRS	ROT	17:34	18:13	1,472.0	0	Drill ahead rotary (Surface) from 1,447 Surface 32 rpm, 2 m/min Avg Flow, 1 6.61 KdaN Avg WOB
D12	DRM	SLI	18:13	19:43	1,485.1	0	Drill ahead sliding from 1,464.97 m to rpm, 3 m/min Avg Flow, 16,142 kPa / Avg WOB
D12	DRS	ROT	19:43	20:09	1,488.1	0	Drill ahead rotary (Surface) from 1,465 Surface 18 rpm, 2 m/min Avg Flow, 1 9.23 KdaN Avg WOB

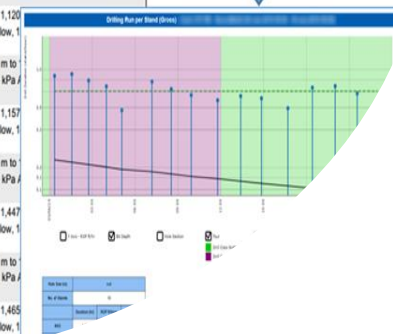


## IDS Automated DDK +

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# Use of DrillOps in FLX

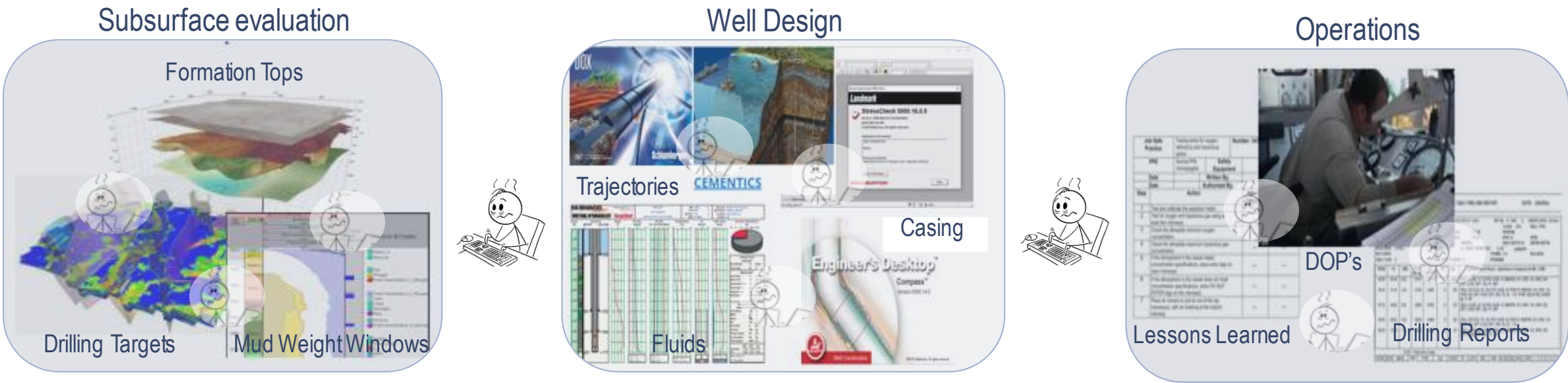
- Implementation of DrillOps Orchestrate to reduce planning time and produce high quality and structured DOP's
- Implement DrillOps Report to automatically capture activity notes and reduce time spent offshore on reporting
- Implement DrillOps Advise to mitigate quality incidents, drive procedural adherence and increase cost efficiency





# FLX ambitions

Go from disrupted workflows with manual data transfers



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to integrated workflows with seamless data transfer

The screenshot displays the DrilOps Predictive Analytics interface. The sidebar on the left contains navigation icons and labels: Predictive Analytics, Data quality, Drilling integrity, Drilling performance, Well integrity, Torque & drag (selected), Drilling efficiency, and Well integrity (beta). The main content area is titled 'Torque & drag' and features a 'Wellbore' and 'Active section' tab. The 'Wellbore' tab shows a vertical wellbore diagram with depth markers (100m, 200m, 300m, 400m, 500m, 600m, 700m, 800m, 900m, 1000m) and a 'Current track' highlighted in blue. The 'Active section' tab shows a 'Torque and Drag' plot with multiple curves (red, green, blue, yellow, orange, purple) representing different parameters. The plot includes a 'Current track' and a 'Torque (kN) (m)' axis. The 'Torque vs. Drag' plot shows a single curve with data points, with a 'Torque (kN) (m)' axis. The top right corner displays 'TELEMETRY' data: 'NO STATE IN SLIPS', 'BD 1664.58 m', 'MD 3921.00 m', 'TSD 2387.05 m', and 'POT 128 13.38'.

The screenshot displays a project dashboard with two main sections, each containing a grid of task cards. Each card shows a task name, a progress bar, and a status indicator (green for complete, red for incomplete).

### ENTER THE NEW PETER SPENT

Task Name	Progress	Status
Define homepage	100%	Complete
Define homepage layout	100%	Complete
Define homepage design	100%	Complete
Define homepage content	100%	Complete
Define homepage images	100%	Complete
Define homepage text	100%	Complete
Define homepage layout	100%	Complete
Define homepage design	100%	Complete
Define homepage content	100%	Complete
Define homepage images	100%	Complete
Define homepage text	100%	Complete
Define homepage layout	100%	Complete

### EXCITE OUR FUNDING SPENT

Task Name	Progress	Status
Define homepage	100%	Complete
Define homepage layout	100%	Complete
Define homepage design	100%	Complete
Define homepage content	100%	Complete
Define homepage images	100%	Complete
Define homepage text	100%	Complete
Define homepage layout	100%	Complete
Define homepage design	100%	Complete
Define homepage content	100%	Complete
Define homepage images	100%	Complete
Define homepage text	100%	Complete
Define homepage layout	100%	Complete

DrillOps
5/24/21 7:40 AM Staffed A Operator Explorer

### A Remote Operation

- Well calendar**
- Well center
- Surveys
- Rig floor display
- EO Advisor
- Steering performance
- Alarms & notifications

### Well calendar

[Report](#) | 
 [Orderbook report](#) | 
 [Show new closed activities](#)

Day

7 Day

Month

Journal

Knowledge management

	TELEMETRY	SEV	RTS	RTD	RTI	RTT
	In Stops	1664.58 m	321.00 m	2187.00 m	10.13 s	13.24

**ACTIVITIES**

< Today >

---

20:30

3 Log 14 [100%] 24 Min

---

20:15

Contract well / Contract section: 16 m / Drill sections: 1600 - 3700 m / Drilling run: 2875 m

---

19:50

Trip in to depth (DBH and lag logs) ...

7 [100%] 50 min

---

20:15

Contract well / Contract section: 16 m / Drill sections: 1600 - 3700 m / Drilling run: 2875 m

---

20:15

**Drill to depth (Drill until BHA is through window)** ...

16 [100%] 9 [100%] 22 Min

---

Circulate to condition hole ...

1 [100%]

---

20:10

Contract well / Contract section: 16 m / Drill sections: 1600 - 3700 m / Drilling run: 2875 m

---

20:05

Trip out to depth (DBH - G m) ...

7 [100%] 51 min

Contract well / Contract section: 16 m / Drill sections: 1600 - 3700 m / Drilling run: 2875 m

### Drill to depth (Drill until BHA is through window) / 16 m / 786 - 926 m

Information and Performance    [Report Entries](#)    Operational Notes    Attachments

No report entries

#### Operational Notes

10:36 12 Jul 2021 @ 09:48m

- Establish drilling parameters according to DD.
- Stop or pump gradually. Stable pressure between each step.

- Start to drill.
- Recommended drilling parameters:  
Flow: 3500-3600 l/min  
Rotation: 60-100 RPM  
Max ECD: 1.36 ISO (PT)  
WOB: 1-10 kN

3. Drill until SLR tools (MSL) are minimum 1-2m below bottom of windows/pack

#### Risk and mitigation:

- Damage window / Jst
  - o Do not rotate through window
  - o Check to test casing window
- Evaluate to POGH and perform push run
- Be aware of possible pack-off
  - o Shut pipe, heel off
  - o Controlled parameters
  - o Note points to work back



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## Digital Well Planning Using DrillPlan to optimize well planning on an old giant

NN.NN.NN

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